

## EDITORIAL ARTICLES.

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### DELBET ON THE DRAINAGE OF THE PERITONEAL CAVITY.

Delbet after the experiments detailed in the May number of the ANNALS OF SURGERY, continues his interesting article in the *Annales de Gynecologie et d'Obstet*, (March, 1890) with the consideration of the subject of the indications for drainage.

These he considers under several heads.

*Duration of the operation.*—This indication recognized by Wiedow is considered only of importance when the length of time depends on conditions that require drainage.

*Extensive adhesions.*—Many surgeons consider this indication clear, but, different varieties of adhesions should not be compared to one another. Sometimes extensive adhesions tear without hæmorrhage and do not call for drainage. At other times intimate and vascular adhesions give rise to excessive hæmorrhage and the drainage tube does not suffice, and the tamponade is required. The question of adhesions is very complex. In general, intimate and vascular adhesions are often an indication for drainage or tamponade.

*Hæmorrhages.*—This is only a question of hæmorrhage from the capillaries or from the vessels which one cannot tie. During the operation compression, hot-water, or the actual cautery is used. But when all these methods have been tried without entire satisfaction what must we do? It is well known that the peritoneum is capable of absorbing blood and can we therefore assume that it is useless to make drainage. It would be a mistake to assume that the same results would follow in a peritoneal cavity whose changed conditions gave rise to hæmorrhage, as in the case where defibrinated blood is injected into healthy peritoneal cavities.

The bleeding surface produced by tearing the adhesions in the majority of cases is in the cul-de-sac or near it, that is to say the most dependent portion of the pelvis. It rests here in contact with the altered tissues, which not only will not absorb it but where the tendency is to pour out more blood.

Delbet does not think in such a case the operator should be satisfied to simply close up the abdomen; he also does not think drainage would suffice, for it would take off the abdominal pressure because the tube puts the abdominal cavity in free communication with the atmospheric pressure and the hæmorrhage is more likely to continue. The indication is to produce a checking of hæmorrhage, and there is nothing better than the aseptic gauze tamponade with or without the sac of Mickulicz.

*Tear or loss of substance of the peritoneum.*—The tear or loss of substance of the parietal peritoneum is not so serious a complication as it was formerly considered. It is to Sklifossonski that we are indebted for precise knowledge on this subject. Sanger has shown that the resection of extensive portions of the parietal peritoneum has not apparently given rise to any trouble, but it is certain that the intestinal coils attach themselves to the peritoneal wound and in these cases recovery is only obtained at the price of extensive adhesions. When the peritoneum has been torn or resected he made every effort to cover over the tear or loss of substance. It is very easy to suture a tear and one can succeed even with loss of substance, thanks to the mobility of the parietal peritoneum. In some cases however this is impossible and the author does not think it advisable to attempt to cover the abraded surface by a graft of epiploon. This complicates an operation already long and severe for an uncertain result. It is an active source of possible infection and it prevents absorption of the blood.

In this case there is nothing better to do than to render the wound surface extraperitoneal and shut in the surface by adhesions in an aseptic condition. Here again is the tamponade indicated.

*Remaining diseased and septic tissues.*—One sometimes finds tumors so adherent that it is almost impossible to recognize their limits. To free them it is necessary to enucleate and we then have left a sort of sac formed by diseased tissues.

In another case, a tube, for example so firmly adherent to the rectum and great vessels that the freeing of the adhesions might rupture these important organs, rather than run this risk it is better to leave part of the tumor. In these cases, of which it is not necessary to multiply examples, there remain in the bottom of the pelvis tissues altered, often septic, in quantity more or less considerable. These tissues may give rise to dangerous secretions. It is not sufficient to conduct them by a tube, because the tubes do not insure the evacuation of the liquids. Besides this might prove dangerous because they would be obliged to traverse healthy portions of peritoneum. In this the indication is to render these tissues extraperitoneal.

There are many methods of accomplishing this. If the sac can be brought to the abdominal incision, it is best to fasten it in this position. Often it is impossible to draw it to the abdominal incision and yet its sides can be drawn together, as done by Martin, who then drains this extra-peritoneal sac by the vagina. When there remains but a small part of the tumor and it cannot be treated by either of these methods, there yet remains the antiseptic tamponade.

*Rupture into the peritoneal cavity of septic areas.*—Only those ruptures that occur in the course of an operation are referred to. The indication here is to wash the septic material out. M. Quénu thinks that in case of rupture of purulent pockets drainage may supplement lavage. Certainly success has been obtained in these cases by the drainage and without lavage. But it would be hazardous to draw an argument from these successes of drainage as against lavage for we know that the virulence of the contents of the tubes differs, even when it has a purulent appearance and one cannot say in those fortunate cases spoken of whether the fluid was septic or not. Delbet thinks that in case of septic infection, during an operation with the peritoneal cavity open, that lavage meets the indication well where drainage meets it poorly, and the surgeon who wishes all the chances of success on his side will use it.

So much for drainage; it is perhaps a supplementary method of precaution to have recourse to, but one of not very great efficacy.

*Rupture of the Intestine.*—After suturing a torn intestine it is a great

temptation to place a strip of iodoform gauze so that it leads from the sutures out through the abdominal wound. This gauze will not interfere with the union of the intestine and will prevent trouble if one of the sutures should give way. This accident does not usually take place until two or three days have elapsed and at this time the gauze is shut in by adhesions, so that instead of a grave peritonitis, we have only a faecal fistula. Of course this method would not be of use where the intestine was freely movable, for it would quickly become displaced. It would only be useful in a portion already affected by inflammatory action and fixed in its position.

*Peritonitis.*—Foci of pelvic peritonitis which one has left in the pelvis have already been considered. When there is a generalized peritonitis at the time of operation, all surgeons consider drainage to be indicated.

*Ascites.*—In case of ascites of mechanical origin it is perhaps not necessary to drain, but in case of ascites due to irritation or inflammation it might be better to use drainage. The subject evidently is not very clear to Delbet. The appearance of the fluid is of some aid in coming to a conclusion. Chyliform ascitic fluid, says Sebileau, always indicates a chronic peritonitis. Gelatinous fluid indicates the rupture of a cyst or a secretion from its external vegations. Bloody ascites ordinarily accompanies malignant tumors. These indications though very incomplete will often be sufficient to enable one to judge if the ascites will persist or disappear after the ablation of the tumor and subsequently if drainage is necessary or not.

*Irrigation by the drainage tube.*—Bardenheuer irrigated by the tube every 24 hours. Martin at first imitated him but in 1882 he renounced the irrigations on account of an accident, which will be mentioned. In America Sims devised a double current tube to facilitate lavage, but to-day irrigations by the tube, very rightly, are almost entirely abandoned.

One of Martin's patients, an old decrepit woman, fell into a collapse after a second washing and died without a trace of septic infection.

In another case each lavage caused attacks of vomiting. These experiences are exceptional, but it is imprudent to force even an aseptic

fluid into the peritoneal cavity, when we cannot be sure to make it return even with the aid of an aspirating force. The absorption of this solution may prove troublesome. At the end of 24 or 48 hours when the adhesions are established, or about to be established, the injection may break them up and establish a communication between infected extra-peritoneal foci and the peritoneal cavity.

*Time and manner of withdrawing the drainage.*—Some surgeons remove the tubes at the end of 24 or 48 hours. If the indication as studied by Delbet be accepted, the tubes should not be removed until adhesions are formed.

It is impossible to indicate the precise time for their removal as this is a matter of surgical tact and differs with each case, but if a drain remains in place for 48 hours adhesions are formed and it is shut in by a little canal so that when it is removed there remains a canal the size of which depends on the size of the drain used.

Too much credit cannot be given M. Delbet for this experimental work. It clearly points out the field of usefulness of the drains, which by causing adhesions shut off the peritoneal cavity from suspicious points.

A. H. BUCKMASTER

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#### KUMMELL ON THE SURGERY OF THE GALL-BLADDER.<sup>1</sup>

Since Langenbuch first totally extirpated the gall-bladder, it has now become a rule that surgeons must interfere in all cases of disease of this viscus which have not been relieved by internal medication, but the operation to be chosen can not be fixed beforehand; it must be modified to suit each case.

Operative interference is indicated in cases of formation of gall stones and their sequelæ, hydrops, and empyema of the gall-bladder, closure of the ductus choledochus, and also in the case of tumors preventing the flow of bile; but these tumors are only found at the time of operation.

<sup>1</sup>Deutsche Medicinische Wochenschrift, 1890, No. 12.

Operative interference is not so much required in the case of gall-stone with biliary colic, as in the cases where these calculi set up inflammation in and around the gall-bladder, which leads to the formation of adhesions, or even ulceration and perforation, the formation of these adhesions being accompanied by a feeling of continuous pain or pressure. It is not rare to see the gall-bladder firmly adherent to the liver by strong connective tissue bands, or even encapsulated, or sometimes it may be adherent to coils of intestine, perforation set in, and the calculi escape in the bowels.

Closure of the cystic duct, due to any cause, leads to retention of the bile in its natural reservoir; this becomes more and more distended, and its contents may become purulent, and we have the picture of hydrops or empyema of the gall-bladder. Such distension may sometimes reach an enormous size and be mistaken for an ovarian cyst.

The following case is an example: A woman, *æt.* 50 years, had suffered for many years from what she called stomach trouble, and noticed six months previously, during one of these attacks, a slow and steady increase of her abdomen. From time to time she had severe pain, which disappeared by the employment of household remedies. On examination, the thoracic and abdominal organs appeared normal. She was anæsthetized, and on the right side of the abdomen a tense, elastic tumor was found; this tumor seemed attached to the uterus, but was not lying next to it. The right ovary could not be felt, and a connection between the tumor and the abdominal organs could not be made out. The diagnosis of a right ovarian cyst was made.

Two days after the examination the patient complained of severe pain in the abdomen, vomiting set in soon, accompanied by marked meteorismus, the pulse became small and thready, the extremities cold, in fact, all the symptoms of perforative peritonitis. The patient died in a short time. On opening the abdomen a diffuse suppurative peritonitis was found. The abdominal cavity was filled with a large quantity of purulent fluid, in which was a large number of gall-stones. It was then seen that the gall-bladder which had been filled with calculi and purulent fluid had attained an immense size and ruptured. The tumor reached down in the pelvis and was adherent posteriorly to the right ovary.

Another and not less weighty indication for operation is the closure of the common bile duct with its accompanying cholæmia. It is true that some serious cases are cured by the spontaneous disappearance of the obstruction, but as soon as symptoms of cholæmia set in, the only chance of saving life is by opening the gall-bladder, and in those cases simple cholecystotomy is the best operation. The operation is not radical, but it provides a free escape for the bile. Often, after the operation, the stone is spontaneously evacuated, or it may be removed by instruments.

The question of diagnosis of disease of the gall-bladder is very easy in a case of simple biliary colic, with its sudden intense pain, scarcely relieved by narcotics, and especially easy when accompanied by icterus. More difficult are the slow chronic cases, with frequent exacerbations, accompanied by closure of the cystic duct. Icterus is absent, the patient complains for a long time of pain in the right side or in the region of the liver, which they often call cramps in the stomach. If it is possible to feel a tumor under the free border of the liver, this is a great help in the diagnosis. In favor of empyema of the gall-bladder there is the tumor, the absence of icterus, the long existence of paroxysmal pains, and the presence of a dull heavy pressure in the hepatic region, which does not disappear between each attack. The recognition of closure of the ductus choledochus is easier to recognize on account of previously existing icterus, and by previous attacks of biliary colic.

In difficult cases an exploratory incision ought always to be made.

The differential diagnosis between tumors of the liver and those of neighboring organs is often extremely difficult.

As for the methods of operation which have been presented there are five important ones.

1. Cholecystotomy, the fixation of the gall-bladder in the abdominal wound and the opening it.
2. The ideal cholecystotomy, opening the gall-bladder, evacuating its contents, sewing it up and replacing it in the abdominal cavity.
3. Cholecysto-enterostomy, the formation of a fistula between the small intestine and the gall bladder (v. Winiwarer).

4. Cholecystotomy and ligature of the cystic duct (Zielewicz).
5. Cholecystectomy (Langenbuch).

Cholecystotomy is without doubt the oldest and safest of these operations. It is done by opening the abdomen and fixing the gall-bladder in the wound, and either opening the latter immediately, or waiting till adhesions have formed and then opening.

Dr. Kummell has operated on two patients by the above method, in one case opening immediately, on account of symptoms of perforation, and in the other case opening the gall-bladder when it was firmly adherent to the wound.

As to the ideal cholecystotomy specially recommended by Küster in cases of solitary stones, the operation does not present many advantages, for there is always danger of the giving way of sutures and extravasation of bile into the abdominal cavity, and although the results obtained are quicker and more brilliant than by the ordinary method, it is not so safe.

The ingenious operation devised by Winiwarter, and later on carried out by Kappeler, is the best in cases of permanent obstruction of the ductus—choledochus, as it brings back the bile into the intestine.

The operation practiced in a case by Zielewicz, of ligating the ductus cysticus, with the subsequent formation of a biliary fistula, when the total extirpation of the gall bladder was impossible, is worthy of a more extended trial. Cases are often seen where the desirable total extirpation of the gall-bladder is impossible, on account of its firm adhesions, but in which, after ligature of the cystic duct, a prompt atrophy of the organ may be expected. This operation might be employed successfully in those cases where not only extirpation is impossible, but where a biliary fistula can not be made on account of the extreme smallness of the organ and its being overlapped by the liver.

The cholecystectomy of Langenbuch, or the total extirpation of the gall-bladder, would be the most radical, and remedy all evil, if the formation of calculi only took place in the gall-bladder, but there are a number of authenticated cases reported in which the formation of gall-stones took place in the liver, and the danger is that one of these calculi should lead to closure of the ductus choledochus and its subse-

quent symptoms, and the only remaining thing to be done would be to crush the stone within the duct, as was once done successfully by Crede.

Dr. Kummell reports two cases in which he extirpated the gall-bladder; the first case died from collapse 20 hours after the operation, and the second recovered completely.

F. C. HUSSON.

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BARDENHEUER ON RESECTION OF THE ARTICULAR CAVITY OF  
THE HIP ON ACCOUNT OF SEPTIC EPIPHYSEAL  
INFECTION<sup>1</sup>.

It is pretty well established at present that in cases of inflammation of the epiphyseal line, it is the proper treatment to separate the epiphysis from the diaphysis before any infiltration or suppuration of the soft parts takes place. When the general symptoms point to a septic inflammation of the epiphyses, the indication for operation is a sharp permanent pain caused by palpation or percussion.

Such early interference always cuts the process short, and prevents the formation of necrosis or of central bone abscess and the extension of the disease to the joint, and general infection. In all cases where Bardenheuer did an early trepanation for this trouble he never saw necrosis or any other sequelæ develop. But in cases where the operation was delayed till suppuration was recognized by palpation he has seen the separation of epiphyses and death follow from general infection notwithstanding the operation. Bardenheuer is of the opinion that in septic inflammation of the epiphyses the disease is primarily a local one, and only after it is fully developed does it cause the disastrous results with which we are all familiar. He bases himself on the results of practical experience, and the results after early operation are so brilliant, while on the other hand death only follows in those cases operated too late, that he cannot help being an enthusiast on early operation.

<sup>1</sup>Deutsche Med. Woch., 1890. No. 19.

The point for diagnosis is comparatively easy in most of the bones of the extremities, but difficult in those plentifully covered by soft parts, such as the hip-joint where the primary seat of the disease is not easy of access, and in these cases, even when the general symptoms point to septic inflammation of the epiphysis it is often very difficult to find out which one is primarily affected, and here the prognosis is much less favorable, from the fact that the primary seat of the disease is discovered too late.

Being convinced of the importance of early operation on the epiphysis Dr. Bardenheuer often operates at a time where the ordinary on-looker would find it difficult to find any alteration in the bone, only a little colored fluid escapes from the spongy alveoli, but the immediate fall in the fever and the complete absence of pain show that the operation was indicated.

Lately the writer has had the chance to see three cases of epiphyseal inflammation of the articular cavity of the hip joint, and in these cases he resected the articular cavity through what he calls his symphysis incision.

CASE I. Boy, æt. 16 years, had for five weeks been suffering from repeated chills, followed by fever, and could not be moved in bed without suffering extreme pain, which was specially located in the left knee-joint. The thigh was strongly flexed. The patient was somewhat stupid and his general appearance was typhoid.

Examination, under chloroform, showed perfect freedom of all the joints of the left lower extremity. Examination by rectum revealed tenderness over the region of the acetabulum, together with some swelling. The iliac fossa was perfectly normal but inguinal glands were much enlarged. A diagnosis of septic epiphyseal inflammation of the acetabulum was made, and the symphyseal incision was made, the periosteum carefully loosened along the iliac fossa into the lesser pelvic cavity where the suppurating focus was found and incised. The triangular junction of the bones forming the acetabulum was found opened and roughened, the periosteum destroyed and much pus escaping from the articular cavity. The head of the femur was dark colored. The whole floor of the articular cavity was chiseled away and the ab-

cess cavity drained by a tube passing forward and escaping under the pubic arch. The upper wound was packed with iodoform gauze. The subsequent progress of the case was excellent. A small piece of the head of the femur came away. The operation had the desired effect of immediately cutting short the septic process. Without this interference in all probabilities the child would have died from sepsis, unless the abscess had come up through the pelvis and opened in the groin, or had broken through the capsule of the joint and thus come to the surface. In the latter case a subsequent resection of the hip would have been needed and a much worse functional result would have followed. This case also shows the possibility of resecting the articular cavity through the pelvis without its being necessary to resect the head of the femur at the same time so as to secure proper drainage.

CASE II. Girl, *æt.*, 2 years, had suffered for 17 weeks from protracted and severe fever which at first resembled typhoid, but many symptoms were missing, especially the intestinal ones. At the end of the seventh week a tumor developed in the groin and in the iliac fossa, which was opened, and five weeks later another formed below Poupart's ligament, to the inner side of the femoral vessels, as well as 3 to 4 cms. below the inferior iliac spine; and a second incision had to be made. The fistulæ secreted large quantities of pus and the patient grew rapidly weaker. In the thirteenth week a sharp hæmorrhage took place from the internal incision, which hæmorrhage could only be controlled by the application of forceps. This weakened the patient still more. Examination by the writer apart from the above described condition showed an impediment to flexion of the thigh. Examination by rectum revealed a large accumulation of pus on the left side of the true pelvis. The region of the left acetabulum was thickened and pressure on this joint caused profuse flow of pus through the fistulæ.

The case was one of septic epiphyseal inflammation. A suprapubic exploratory incision was made reaching from the symphysis pubis to the outer third of Poupart's ligament, and the peritoneum was carefully dissected backward for quite a distance. An abscess was found on the inner wall of the lesser pelvis, and in the region of the acetabulum there was a bony fissure through which pus escaped. The

whole of the acetabulum was resected and the peritoneum pushed aside.

The patient was very feeble. Died in the course of the afternoon, six hours after the operation. Death was due partly to collapse and partly to sepsis.

CASE III. Child, *æt.* 5 years; came to the hospital on account of a large abscess in the iliac fossa. The trouble had set in after a severe fever which had gradually diminished. The abscess was freely incised by the House Surgeon, but notwithstanding this supuration still kept up. Examination showed the presence of an abscess near the acetabulum, but the movements at the hip-joint were yet good. On exploring the pelvis by the symphyseal incision this abscess was located and opened, and the region of the acetabulum which was found to be denuded of periosteum was resected. The head of the femur was covered with granulations.

One week later, on account of the continuation of the fever and supuration, the head of the thigh bone was resected in the typical manner, and soon after the patient made a perfect recovery.

Dr. Bardenheuer is of the opinion that this exploratory incision and this method of resecting the acetabulum should be more frequently employed, for many cases of tubercular disease of the acetabulum are discovered too late to be operated on.

F. C. HUSSON.

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#### ON THE DEVELOPMENT OF CALLUS AFTER FRACTURE OF LONG BONES.<sup>1</sup>

The author contributes a very valuable monograph on the subject, embodying his own experimental and clinical researches, which were conducted partly in Professor N. V. Sklifosovsky's clinic, in Moscow, partly in his own surgical wards in the Poltava Zenesky Hospital. The cardinal point of the work was to study the development of callus, *a*, in such cases where fractured bone retained its periosteum, and, *b*, in such where fragments were stripped of their periosteum at

<sup>1</sup>Moscow Inaugural Dissertation, 1889, by DR. LEONID G. VASILIEFF, of Poltava, South Russia.

a more or less considerable area. The experiments (36 in number) were carried out on puppies, adult dogs, and rabbits. The essential outcome of the author's researches may be summarized somewhat as follows:

A. *Fracture with retained periosteum.* (1.) The formation of callus represents a regenerative process *sui generis*. It occurs totally independently of inflammation which makes its appearance immediately after fracture to attain its height about the end of a third day after the injury. The inflammatory process does not in the least promote the development of callus; on the contrary, it distinctly interferes with the latter, reparation of bone beginning only after the subsidence of inflammation. (2) The starting point of or impulse for the appearance of the reparative process (as well as of the inflammation) is constituted by irritation of the periosteum and bone-marrow, induced by traumatic violence and consecutive lesions (contusion, crushing and rupture of tissues, hæmorrhage). (3) Leucocytes which escape from vessels during inflammation never transform into osteoblasts, their functions being, probably, limited to absorbing detritus of tissue and blood-clots. At all events, they ultimately undergo disorganization and disappear. (4) The regenerative process begins on a third day after fracture, appearing first of all in the osteogenic layer of the periosteum. The initial phenomena consist in a karyokinetic proliferation of cells of the larger as well as of the intima and adventitia of local blood-vessels. Such newly-formed elements subsequently transform into osteoblasts, which similarly multiply themselves by a karyokinetic scission. In the presence of local friction or pressure, the young cells may transform into cartilaginous elements, instead of osteoblasts. In the course of time, some of such cartilage-cells undergo atrophy to yield their place to newly formed osseous and connective tissues; most of them, however, transform, by way of metaplasia, into bone-tissue, the impulse for the metaplastic process being given by vascularization of cartilaginous islets. (5) Osseous metamorphosis of osteoblasts proceeds in the way described by Waldeyer and Streltsoff; that is, peripheral zones of their protoplasm become impregnated with lime and coalesce with analogous zones of adjacent osteoblasts to

form an intercellular osseous substance, while a central portion of protoplasm together with the nucleus transforms into bone-corpuscle and bone-cell. (6) The bone tissue formation always begins at some distance from the fractured surface of the fragment to gradually advance to the latter and into the inter-fragmental space. (7) At the same time, osteoblasts covering the walls of the central medullary canal (which elements partly preexist therein, but mostly penetrate into the cavity through Haversian canals from proliferating osteogenic layer of the periosteum) similarly transform into bone-tissue, the process again starting at some distance from the fracture surface to gradually reach the latter. The bone marrow is thus crowded out into the interfragmental space to undergo transformation first into connective and cartilaginous tissues and then into osseous callus. (8) Any blood-clots which are mostly lying in the interfragmental place are gradually absorbed, being replaced by ossifying bone-marrow. They never undergo metamorphosis into callus. They behave like foreign bodies, interfering with the reparative forces and retarding the development of an interfragmental callus. (9) Simultaneously with the throwing out of callus, old bone-tissue about the fragment end becomes disintegrated and absorbed, being replaced by a newly-forming one. (10) Vascularization of thickened periosteum continues since a third day after fracture and proceeds by way of karyokinetic scission of cells of the adventitia and intima. (11) The callus formation ends with a complete consolidation of fragments by newly-formed bone-tissue, which requires over two months (under favorable conditions). When examined before the term, callus proved to contain more or less numerous islets of connective or cartilage tissue, scattered chiefly over the interfragmental space.

B. *Fractures with stripped off periosteum* ("Fracturae cum oblatione periostei"). (1) Consolidation of fracture proves to be still possible even in cases complicated with loss of the periosteum. (2) The sources for an external callus prove to be, *a*, the adjacent intact periosteum; *b*, periosteal shreds and strings which are always found attached here and there to the fragment's surface; *c*, cellular elements of Haversian canals. (3) The development of an internal callus proceeds

nearly parallel with that of an external one, its sources being, *a*, osteoblasts of bone-marrow; *b*, osteogenic elements of adherent shreds of the periosteum; *c*, those of Haversian canals. (4) An interfragmental callus develops only after the external and internal one has attained the fractured surface. It is supplied by, *a*, bone-marrow of the central medullary canal; *b*, internal callus; *c*, osteoblasts of Haversian canals emerging on the fracture surface; *d*, those of external callus. (5) Surrounding soft tissues do not take any direct part in the callus formation; they only become adherent to callus and may give some additional support to the latter. (6) Mobility of fragments always lasts a good deal longer than in cases of fracture with retained periosteum. (7) Callus is always weaker and less bulky. (8) Consolidation proceeds at least twice as slowly as in the case of retained periosteum. (9) Sequestration of the fragment's end occurs very frequently. (10) Non-union and formation of false joints are similarly most frequent. (11) On the whole, destruction of the periosteum on the fragment's end must be regarded as a very grave complication, making the prognosis materially worse. (12) In all cases of compound fractures of long bones, the state of the periosteum should be inquired into, and the loss of the periosteum regarded as a more important complication than the open wound itself. (13) Such cases imperatively demand a strictly antiseptic management.

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